

Listing of Claims:

1. (currently amended) X-ray imaging device with computer means which is provided for visualizing the blood flow in a coronary vascular tree of a patient such that the visualization is effected based on data which contain a first set of X-ray projection images of the vascular tree in various phases of the heart cycle, a first ECG of the patient recorded simultaneously with the first set, a second set of X-ray projection images recorded during or after the administration of a contrast agent and a second ECG of the patient recorded simultaneously with the second set, which computer means comprise a program control which operates in accordance with the following method steps for determining the time-dependent concentration of the contrast agent within the three-dimensional structure of the vascular tree:

Reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

Determining the time-dependent concentration of the contrast agent within the reconstructed three-dimensional structure of the vascular tree by

aa) Assignment of the second set of X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG;

bb) Finding local image areas assigned to the individual vascular segments within the second set of X-ray projection images of the second set corresponding to the spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

cc) Determining the concentration of the contrast agent within the vascular segments by evaluating the X-ray absorption within the local image areas found in the method step bb); and

Visualization of the flow of the contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent distribution concentration of contrast agent.

2. (currently amended) X-ray imaging ~~method~~-device as claimed in claim 1, wherein the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with the contrast agent and then the first set of X-ray projection images is recorded after the vascular tree is completely filled with the contrast agent.
3. (currently amended) X-ray imaging device as claimed in claim 1, ~~with~~further comprising means for generating the first and the second set of X-ray projection images of the coronary vascular tree of the patient under various projection directions and ~~with~~ means for recording the ECG of the patient during the recording of the first and second sets of X-ray projection images.
4. (currently amended) X-ray imaging device as claimed in claim 2, wherein the computer means are arranged such that during or after the administration of the contrast agent ~~first~~ the second set of X-ray projection images is recorded while the vascular tree fills with contrast agent, and subsequently~~then~~ the first set of X-ray projection images is recorded, after which the vascular tree completely fills with the contrast agent.
5. (currently amended) X-ray imaging device as claimed in claim 2, wherein the computer means are further arranged such that the recording of at least one of the first and ~~or~~ second set of X-ray projection images is effected at a plurality of projection angles by means of continuous rotation-X-ray imaging.
6. (currently amended) X-ray imaging device as claimed in claim 1, wherein the computer means ~~Rare~~ are arranged such that for reconstructing the three-dimensional structure of a computer-aided modeling of the vascular tree is effected while eliminating the other anatomical structures contained in the first set of X-ray projection images.

7. (currently amended) Computer program for an X-ray imaging device for visualization of the blood flow in a coronary vascular tree of a patient, wherein the computer program receives as input variables data which contain a first set of X-ray projection images of the vascular tree in various phases of ~~the~~a heart cycle, a first ECG of the patient recorded simultaneously with the first set, a second set of X-ray projection images recorded during or after the administration of a contrast agent and a second ECG of the patient recorded simultaneously with the second set, which computer program on the computer means of the X-ray imaging device implements a program control which operates in accordance with the following method steps for determining ~~the~~a time-dependent concentration of the contrast agent within ~~the~~a three-dimensional structure of the vascular tree:

~~R~~reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

~~D~~determining the time-dependent concentration of the contrast agent within the reconstructed three-dimensional structure of the vascular tree by

aa) ~~A~~assignment of the X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG;

bb) ~~F~~finding local image areas assigned to the individual vascular segments within the X-ray projection images of the second set ~~that~~ that ~~C~~corresponding to the spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

cc) ~~D~~determining the concentration of the contrast agent within the vascular segments by evaluating ~~the~~an X-ray absorption within the local image areas found in the method step bb);

~~V~~visualization of ~~the~~the flow of the contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent ~~distribution~~concentration of the contrast agent.

8. (currently amended) X-ray imaging method for visualizing the blood flow in a coronary vascular tree of a patient having the following method steps:

a) ~~R~~ecording a first set of X-ray projection images of the vascular tree during various phases of ~~the~~a heart cycle while simultaneously recording a first ECG of the patient;

b) ~~R~~ecreconstruction of ~~the~~a three-dimensional structure of the vascular tree during the various phases of the heart cycle from the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

c) ~~R~~ecording of a second set of X-ray projection images of the vascular tree during or after ~~the~~-administration of a contrast agent while a second ~~S~~ECG of the patient is being recorded;

d) ~~D~~etermining ~~the~~a time-dependent concentration of the contrast agent within ~~the vascular tree's~~a three-dimensional structure of the vascular tree as reconstructed in the method step b) by

aa) ~~A~~ssignment of the X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG;

bb) ~~F~~inding local image areas assigned to the individual vascular segments within the X-ray projection images of the second set corresponding to ~~the~~-spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

cc) ~~D~~etermining the concentration of the contrast agent within the vascular segments by evaluating ~~the~~an X-ray absorption within the local image areas found in the method step bb);

e) ~~V~~isualization of ~~the~~-flow of the contrast agent through the three-dimensional structure of the vascular tree according to ~~the~~a time-dependent distribution~~concentration~~ of the contrast agent determined in method step d).

9. (currently amended) X-ray imaging method as claimed in claim 8, wherein ~~first~~ the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with the contrast agent and then the first set of X-ray projection images is recorded after the vascular tree is completely filled with the contrast agent.

10. (currently amended) X-ray imaging method as claimed in claim 8, wherein the recording of at least one of the first and/or second set of X-ray projection images is effected using continuous rotation-X-ray imaging at a plurality of projection angles.

11. (currently amended) X-ray imaging method as claimed in claim 8, wherein the recording of the second set of X-ray projection images is effected at at least one or more fixed projection angles.

12. (previously presented) X-ray imaging method as claimed in claim 8, wherein a computer-aided modeling of the vascular tree, with elimination of other anatomical structures contained in the first set of X-ray projection images, is effected to reconstruct the three-dimensional structure in method step b).